# CAULKING TUBE SEALING CAP

## FIELD OF THE INVENTION

The instant invention relates generally to containers useful for dispensing sealants, glues or other viscous materials; particularly to caulking guns and tube containers, and most particularly to a caulking tube sealing cap constructed and arranged to cooperate with a caulking tube tip to prevent air from entering the tube when the cap is in operation.

## BACKGROUND OF THE INVENTION

Viscous construction materials such as adhesives, fillers, patching materials, caulking and other sealants are inefficiently utilized without proper packaging. Such construction materials are generally packaged into tubes or cartridges made of cardboard or plastics. These tubes or cartridges include an integral tapered nozzle usually made of plastics or metals. Before use, these tubes are loaded into a tool referred to as a caulking gun which enables neat and efficient dispensation of the construction materials contained within the tube. The caulking gun user clips the tip end of the nozzle and perforates the internal membrane in order to create an opening for extrusion of the material in a thin

ribbon onto a desired surface.

Frequently, one project does not require use of the entire contents of a caulking tube. When the partially filled tube is stored for future use, the remaining contents are often exposed to air and as a result dry out and harden. The material in the dispensing nozzle is particularly vulnerable to hardening upon air exposure. A tube having a nozzle blocked by hardened material will no longer function to neatly deliver material. The tubes are often broken in attempts to gain access to the remaining material therein. Thus, partially filled tubes are frequently discarded and the remaining usable material wasted. The waste of materials typically increases the cost of already expensive construction projects.

Many attempts have been made to avoid hardening of left over materials and thus avoid waste by blocking the orifice in the opened nozzle with nails, screws, wire nuts and/or tape. Only limited success has been achieved because such attempts failed to completely block the passage of air into the opened tubes.

There remains a need in the art for an efficient, easy-to-operate cap or seal capable of completely preventing air from entering a caulking tube and thereby extending the shelf-life of the material remaining in the tube.

DESCRIPTION OF THE PRIOR ART

Many attempts have been made to improve the dispensation of materials contained within caulking tubes, a few examples known in the art are:

U.S. Patent No. 5,104,013, teaches an adaptor for a caulking tube nozzle that is adjustable for different caulk bead sizes. The adaptor includes a reducing coupling having a large end secured to the caulking tube nozzle and a small end which is threaded. A cap having threads for engagement with the threads of the small end of the coupling engages the reducing coupling to allow different sized beads of caulking to be dispensed. Prior art such as this has demonstrated that thread seals alone are not dependable to prevent caulking from hardening within the tip.

US Patent 4,957,225 teaches a replaceable caulking tip for use on the tubular nozzle of a caulking cartridge or the like. The tip includes a tubular body which is internally threaded for replaceable engagement on the nozzle. An outlet orifice is formed at the other end of the body with substantial body material surrounding the orifice to permit shaping of the tip. The tip facilitates application of caulking material in joints and elsewhere while facilitating formation of a smooth bead of caulking material.

US Patent 5,894,956 teaches a disposable replacement tip

for bypassing solidified material contained in a caulking tube tip. The device includes a conical first end portion tapered acutely to a distal sharpened point. The sharpened point of the first end portion may be driven into the end opening of a caulking tube, or through the sidewall of the caulking tube, and the device is rotated manually to access the unsolidified, flowable material therein.

US Patent 4,382,530 teaches an interchangeable nozzle apparatus for a caulking gun that includes a base member which is fittable over the tapered nozzle on a caulking tube and has a universal mounting surface thereon, a plurality of nozzle attachments of different diameters each having a similar mounting portion which mates with the universal base mounting portion, and a securing member such as a thumbscrew for affixing any one of the attachment nozzles to the base member. The nozzle apparatus provides for caulking tube nozzle diameter which is easily changed according to the requirements of a particular project.

US Patent 5,833,099 teaches a caulking nozzle removably attachable to a caulking tube. The nozzle includes a hard female insert which includes a flexible elongated tube having an opening for dispensing caulking. The caulking nozzle is useful for the application of caulking material to areas where access is difficult, however it does not provide any means for

sealing an open tube.

US Patent 4,946,081 teaches a discharge nozzle for a tube of sealant materials which is provided with an aperture or slot that allows the user to monitor the rate of flow of sealant from the tube to assist in the formation of a smooth bead or fillet of sealant material when it is applied through the nozzle to a substrate. The aperture of the nozzle provides controlled resistance to flow which improves discharge and smoothing of materials from the tube.

US Patent 5,743,668 teaches an adjustable tip caulking tube including a tapered nozzle having an open inner end and an open outer end. The open inner end has a diameter greater than a diameter of the open outer end. The open inner end couples with an opening in a front end of a caulking tube. A dial couples with the tapered nozzle whereby movement of the dial away from the open outer end will reduce the diameter of the caulking aperture. The tip taught is useful for filling areas of differing widths with caulk.

US Patent 2,815,895 teaches a dispensing cap connectable to the neck of a collapsible tube holding a quantity of a glazing compound. The cap is formed with a cylindrical body having an axial end to end bore, one end of which is counterbored and threaded to engage the threads of a neck. An annular sealing gasket seats upon the shoulder defined at the

inner end of the counterbore. The dispensing cap of Reed provides a means which will speed up and facilitate the application of a material in a desired, molded cross-sectional shape, usually when installing window glass.

US Patents 5,573,281 and 5,462,317 teach an adapter for attachment onto an outlet of a dispensing means such as a mixing device. The device comprises a connecting part for attachment to the outlet of the dispensing means to which other parts can be connected or which can be a specially formed outlet itself. This connecting part comprises a cylindrical or an approximately frusto-conical internal surface part having a self-cutting thread for attachment onto an external surface of the outlet of the mixing device or other dispensing device. Such an adapter can be easily attached to the outlet of a standard static or dynamic mixer or other dispensing device having a stepped external surface, thus eliminating the necessity to keep an inventory of mixers with different outlets or outlet connections.

US Patent D335,809 shows an ornamental design for a nozzle for dispensing adhesive, sealants and caulks.

SUMMARY OF THE INVENTION

The instant invention provides a caulking tube sealing cap which may be threaded onto a standard caulking tube nozzle tip after the tube has been opened. When in operation, the cap of the invention provides airtight sealing, thereby extending the shelf life of the unused caulk remaining in the tube.

The cap is preferably a frusto-conically shaped plastic member generally including an internal threaded cavity with a smooth or knurled external gripping surface. A knurled external surface facilitates gripping and rotation of the cap when in operation. The internal threads are preferably tapered to match the external surface of the caulking tube nozzle tip and may be fine or coarse in pitch and may contiguously cover the internal surface of the cavity or they may be segmented. The internal threads of the cap are constructed and arranged to either form or cut threads on the exterior surface of the caulking tube nozzle upon threading onto the tip. The plastic of the cap is of sufficient hardness to allow the internal threaded surface to cut into or form the exterior surface of the caulking tube nozzle, which is generally constructed from a softer plastic than the preferred plastic of the cap. The internal cavity also includes an integrally formed sealing ring constructed and arranged to cooperate with the outer surface of the caulking tube nozzle to prevent air from entering the tube.

The sealing ring may comprise, for example, but should not limited to, integrally formed polymeric rings, integrally molded elastomeric rings, O-rings, gaskets or metal ring inserts. The cutting and/or forming action of the internal threads allows the sealing ring to be pulled tightly against the exterior surface of the caulking tube nozzle. In operation, the cap is threaded onto the nozzle of an open tube of caulk until the internal sealing ring contacts the tip seating the sealing ring to prevent air from entering the tube.

Accordingly, it is an objective of the instant invention to provide a caulking tube sealing cap capable of providing airtight sealing of opened caulking tubes through a combination of cutting threads and an integrally formed sealing ring which cooperate with a caulking tube nozzle.

It is a further objective of the instant invention to provide a caulking tube sealing cap capable of providing airtight sealing of opened caulking tubes through a combination of forming threads and an integrally formed sealing ring which cooperate with a caulking tube nozzle.

It is yet a further objective of the instant invention to provide a caulking tube sealing cap which when in use extends the shelf-life of unused caulking remaining in a tube.

Other objectives and advantages of the instant invention will become apparent from the following description taken in

conjunction with the accompanying drawings wherein are set forth, by way of illustration and example, certain embodiments of the instant invention. The drawings constitute a part of this specification and include exemplary embodiments of the present invention and illustrate various objects and features thereof.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 is a front view of the instant invention illustrated in cooperation with a caulking tube tip;

Figure 2 is section view of one embodiment of the instant invention taken along the longitudinal centerline;

Figure 3 is an end view of the embodiment shown in Figure 2 illustrating the continuous helical threads;

Figure 4 is a side view partially in section illustrating one embodiment of the instant invention in cooperation with a caulking tube tip;

Figure 5 is a section view of one embodiment of the instant invention taken along the longitudinal centerline;

Figure 6 is an end view of the embodiment shown in Figure 5 illustrating segmented helical threads;

Figure 7 is a side view partially in section illustrating one embodiment of the instant invention in cooperation with a caulking tube tip;

Figure 8 is a side view partially in section illustrating one embodiment of the instant invention in cooperation with a caulking tube tip.

DETAILED DESCRIPTION OF THE INVENTION

For the purposes of promoting an understanding of the principles of the invention, reference will now be made to the embodiment illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the invention is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the invention as illustrated therein being contemplated as would normally occur to one skilled in the art to which the invention relates.

Referring to Figures 1-4 of the instant invention, it can be seen that a sealing cap 100 capable of sealing air out of an open caulking tube is shown. The sealing cap includes a body member 10 having a solid top portion 12 and a depending annular wall 14 forming an inner cavity 16, the top portion and the annular wall having a common outer surface 18. The inner cavity 16 includes a caulking tube engagement means illustrated herein as continuous helical threads 20. The continuous helical threads which cooperate with a caulking tube tip 22 are constructed and arranged to form threads on the outer surface of the caulking tube tip 22. The threads of the preferred embodiment are tapered to conjugately match the outer tapered surface 24 of the caulking tube tip 22. The inner cavity 16

also includes a sealing means illustrated herein as an integrally formed sealing ring 26. The sealing ring is constructed and arranged to compressively engage the outer surface 24 of the caulking tube tip 22. The cooperation between the sealing cap and the caulking tube tip provide compressive engagement with the sealing means to prevent air from entering the caulking tube 25. In this manner air is prevented from entering a previously opened caulking tube 25 thereby preserving the unused contents for future use. The outer surface 18 includes a gripping means constructed and arranged to provide gripping for rotational engagement between said caulking tube tip and the sealing cap. The gripping means of the preferred embodiment is illustrated herein as integrally formed knurling 28. Knurling is well known in the art and may include, but should not be limited to, straight knurling, diagonal knurling and/or diamond knurling and the like.

Referring to Figures 5 and 6, an alternative embodiment of the instant invention is illustrated. In this embodiment the internal threads 30 are constructed as segments 33. Each of the segments includes a cutting edge 34 constructed and arranged to at least partially cut threads on the outer surface of the caulking tube tip. Between each of the segments is a flute 32. The flute is adapted to channel and/or hold any debris or caulking loosened from the outer surface of the

nozzle tip during the thread cutting. The flutes 32 may be straight such as those shown or alternatively may be angled or helical as is well known in the art.

In an alternative embodiment (not shown) the threads may include multiple leads to facilitate full engagement of the sealing cap with fewer rotations when compared to single lead threads.

Referring to Figure 7, an alternative embodiment of the instant invention is illustrated having an O-ring 36. The O-ring is supported within a standard O-ring groove 38 formed within the depending wall 14 and facing the inner cavity 16. The construction of the O-ring and groove cooperate with the caulking tube tip outer surface 24 to prevent air from entering a previously opened caulking tube 25, thereby preserving the unused contents for future use. The O-rings are preferably constructed from materials well known in the art which may include, but should not be limited to, Cork, Gasket Material, Leather, Rubber, Buna-N, Silicone, Neoprene, Tetraflouroethylene, Viton or suitable combinations thereof.

Referring to Figure 8, a further alternative embodiment of the sealing cap 10 is illustrated wherein the sealing means includes an elastomeric ring 40 or metal ring (not shown) integrally molded into the depending wall 14 within the cavity of the sealing cap.

As will be appreciated by those skilled in the art from a study of the figures and the above description, the sealing cap 100 is formed primarily from molded components. In a present form, the sealing cap 100 is preferably formed primarily from polymeric material using an injection molding process. Those skilled in the art will recognize that there are various other materials and processes that can be used to manufacture the sealing cap 100 and its components, these other materials and process have been contemplated and may be substituted without departing from the scope of the present invention.

All patents and publications mentioned in this specification are indicative of the levels of those skilled in the art to which the invention pertains. All patents and publications are herein incorporated by reference to the same extent as if each individual publication was specifically and individually indicated to be incorporated by reference.

It is to be understood that while a certain form of the invention is illustrated, it is not to be limited to the specific form or arrangement herein described and shown. It will be apparent to those skilled in the art that various changes may be made without departing from the scope of the invention and the invention is not to be considered limited to what is shown and described in the specification.

One skilled in the art will readily appreciate that the

present invention is well adapted to carry out the objectives and obtain the ends and advantages mentioned, as well as those inherent therein. The embodiments, methods, procedures and techniques described herein are presently representative of the preferred embodiments, are intended to be exemplary and are not intended as limitations on the scope. Changes therein and other uses will occur to those skilled in the art which are encompassed within the spirit of the invention and are defined by the scope of the appended claims. Although the invention has been described in connection with specific preferred embodiments, it should be understood that the invention as claimed should not be unduly limited to such specific embodiments. Indeed, various modifications of the described modes for carrying out the invention which are obvious to those skilled in the art are intended to be within the scope of the following claims.